Amendments to the Specification

The paragraph starting at page 2, line 22 has been amended as follows.

Then, in order to apply an appropriate drive energy to the ink jet print head, ~~it is~~ generally, ~~performed that~~ the ink ejection condition or print condition ~~to~~ on the printing medium is observed while changing applied voltage or pulse width to the ink jet print head to measure a threshold voltage or pulse width of ejection of each ink jet print head, and the measured value is multiplied with a margin value K determined by a separate experiment so that an optimum drive condition is set.

The paragraph starting at page 3, line 11 has been amended as follows.

~~Then, in~~ Japanese Patent Laid-open Publication No. 6-320732 provides memory means such as an EEPROM at the ink jet print head side in which the previously measured optimum drive condition of the ink jet print head is stored so that the stored data is retrieved to the ink jet print apparatus side to perform optimum ejection drive control for each print head.

The paragraph starting at page 3, line 18 has been amended as follows.

However, like the above conventional art, even when the memory means is provided in the ink jet print head and the memory means is stored with the optimum drive

B2 Cont.

condition of the print head, because the optimum drive condition is just one ~~which~~ stored at the initial condition, the actual optimum drive condition may change as the ink jet print head is used for an extended time.

The paragraph starting at page 5, line 1 has been amended as follows.

B3

An aspect of the present invention is a method for controlling the drive energy of an ink jet print apparatus for ejecting ink from an ink jet print head to a printing medium by driving a print element. The method comprises the following five steps. The first step is a step for supplying a plurality of different drive energies successively to the ink jet print head. The second step is a step for monitoring temperature of ~~each of~~ the ink jet print head according to the supply of ~~the~~ each drive energy. The third step is a step for judging a threshold drive energy required for ink ejection of the ink jet print head using a value for the supplied drive energy and a value for the monitored temperature. The fourth step is a step for determining a drive condition for ejecting ink on the basis of the threshold drive energy. And the fifth step is a step for driving the print element on the basis of the determined drive condition.

The paragraph starting at page 5, line 24 has been amended as follows.

B4 Cont

Another aspect of the present invention is a method for controlling the drive energy of an ink jet print apparatus wherein a print element is driven to eject an ink from

an ink jet print head to a printing medium for performing printing. The method comprises the following four steps. The first step is a step for supplying a plurality of different drive energies successively to said ink jet print head. The second step is a step for monitoring temperature of ~~each of~~ said ink jet print head according to the supply of each said drive energy. The third step is a step for determining a drive condition for ejecting ink using a value for said supplied drive energy and a value for said monitored temperature. And the fourth step is a step for driving said print element on the basis of said determined drive condition.

The paragraph starting at page 7, line 12 has been amended as follows.

Fig. 6 is a graph showing head temperature and pulse width of drive pulse signal; ~~and~~

The paragraph starting at page 7, line 14 has been amended as follows.

Fig. 7 is a flow chart showing the relationship of Figs. 7A and 7B; and

The paragraph starting at page 11, line 16 has been amended as follows.

A mechanical controller 604, by an instruction from the CPU 602, drives a mechanism (mechanical part) 605 such as a carriage motor 81 or line feed motor or the

like. A sensor/SW controller 606 transmits signals from a sensor/SW 607 comprising various sensors and SW (switch). A display device controller 608 controls LEDs of a display panel group and a display device 609 comprising liquid crystal display devices and the like by instructions from the ~~CPU602~~ CPU 602. A print head controller 610 drives and controls the print head IH by instructions from the ~~CPU602~~ CPU 602 and detects temperature information and the like showing conditions of the print head IH and transmits these to the ~~CPU602~~ CPU 602.

The paragraph starting at page 15, line 18 has been amended as follows.

~~In a~~ A drive energy threshold value detector 111, when the above sequence is started, successively receives sequentially decreasing drive energy information from the head drive controller 108 and corresponding head temperature information from the head temperature detection circuit 105, and judges a drive energy threshold value according to ~~these~~ this information.

The paragraph starting at page 16, line 11 has been amended as follows.

The memory 102 of the print head IH, as described above, stores a voltage (K · Vth), based on a previously measured ink ejection threshold voltage Vth multiplied by a predetermined margin value K, as an optimum head drive voltage Vop. Therefore, in the head drive controller 108, when each heat generation resistor element 502 of the print head

B8 Cont'd

IH is driven, the optimum head drive voltage Vop is read from the memory 102, and the actual drive voltage is determined according to the voltage value Vop.

The paragraph starting at page 19, line 1 has been amended as follows.

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In this case, in area B, the head temperature T increases with decreasing ~~the~~ pulse width ~~Pw;~~ Pw; this is considered as due to the fact that ejection/non-ejection is mixing because of variation of the plurality of nozzles.

The paragraph starting at page 19, line 22 has been amended as follows.

B10

In the present embodiment, since voltage Vop/K, which is the optimum drive voltage Vop divided by the margin value K, is used at the time of measurement, the above calculated pulse width threshold value Pth can be ~~uses~~ used, as is, as the optimum value Pop. Of course, Vop becomes the optimum drive voltage.

The paragraph starting at page 24, line 17 has been amended as follows.

B11

The present invention can be also applied to a so-called full-line type print head whose length equals the maximum length across a printing medium. Such a print head may ~~consists~~ consist of a plurality of print heads combined together, or one integrally arranged print head.

The paragraph starting at page 26, line 11 has been amended as follows.

In addition, the present invention can be applied to such apparatus where the ink is liquefied just before the ejection by the thermal energy as follows so that the ink is expelled from the orifices in the liquid state, and then begins to solidify on hitting the printing medium, thereby preventing the ink evaporation: the ink is transformed from solid to liquid state by positively utilizing the thermal energy which would otherwise cause the temperature rise; or the ink, which is dry when left in air, is liquefied in response to the thermal energy of the printing signal. In such cases, the ink may be retained in recesses or ~~through holes~~ through-holes formed in a porous sheet as liquid or solid substances so that th ink faces the electrothermal transducers as described in Japanese Patent Application Laying-open Nos. 54-56847 (1979) or 60-71260 (1985). The present invention is most effective when it uses the film boiling phenomenon to expel the ink.

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